Thesis Project Portfolio

Improving Patient Flow in a Healthcare Clinic Post COVID-19: A Data Validation and Exploratory Analysis Approach

(Technical Report)

Analysis of the Failure of the Epic EHR Implementation in a Hospital System in Denmark

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

Emily Riggleman

Spring, 2023

Department of Systems and Information Engineering

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Sociotechnical Synthesis

My STS research connects to my technical capstone work in that they both explore the impact of the Epic Electronic Health Record (EHR) in health systems. The STS research focuses on a specific case of Epic utilization and explores why it was unsuccessful. My technical work involves hands-on data collection and analysis utilizing many sources of information, one of which is Epic timestamp output. While my research focuses on the failure of Epic specifically, and my technical work is wider in scope with a greater objective of increasing efficiency, they both utilize Epic as a technology to improve provider workflows.

My client for the technical project was UVA Health's University Physicians Clinic (UPC). The project ranged in methods, including analysis of observational data and Epic EHR timestamps and the creation of a discrete-event simulation to explore various what-if scenarios. The observational data were cross-matched against the timestamps Epic would output and found several irrational results. These discrepancies indicated a significant gap in understanding what triggers these times, which makes it difficult to glean any information from this data for future analysis. The simulation used only accurate timestamps within a reasonable confidence level. The results from the simulation experiments supported providers and clinic leaders in advocating for more nursing staff. The analysis also showed that potential policies administrators want to explore would not be feasible in current workflows.

My STS research paper uses the principles of Actor-Network theory (ANT) to argue that successful Epic workflow implementation requires synonymous goals across all levels of the health system. Administrators need to have goals aligned with front-line health workers and vice versa. The specific case I researched demonstrated the contentious relationship. The hierarchical programs put in place as part of the Epic implementation only exacerbated the antagonistic relationship between actors. The administration established these hierarchical programs to push their goals instead of shifting to have goals aligned with most other actors. Epic is a beneficial technology in health workflows and significantly increases efficiency, but only when fully utilizing its comprehensive capabilities. Epic's advantages were lost in the specific STS case I researched, and the EHR was not supporting the system's efficiency.

Working on these projects concurrently improved how I viewed my technical client's problems. The STS research was on a specific case where there were many roadblocks due to the antagonistic relationship between physicians and the greater hospital administration. I noticed that same relationship in my real-world technical work. This disagreement framed our goal to generate data that would help support providers' calls for support in the inefficient clinic. It further showed that a strong, supportive relationship between health system administration and the field workers is critical for creating a successful network that serves patients with high access to quality care. The hands-on aspect of the technical project also served as context to understand the STS case study. Working on both my technical and STS project in parallel increased my ability to meet the project objectives of utilizing Epic EHR technology to improve workflows within health systems.